JANUARY
1970
45¢

Live Steam

THE MONTHLY MAGAZINE FOR ALL LIVE STEAMERS AND LARGE-SCALE MODEL RAILROADERS

in this issue

Queen of the Fleet

Whistles

Tenders

Drilling

Live Steam
magazine

JANUARY 1970 VOL. 4 NO. 1

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COVER PHOTO

One of the Pere Marquette's "Queen of the Fleet" Class SP-3 Pacifics, Engine 7?2, heads out of Grand Rapids for Detroit on a Fall day in 1942. Photo by William C. Fitt.

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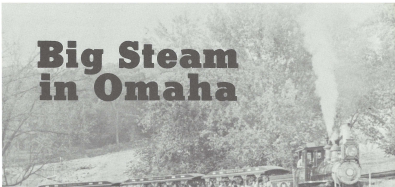
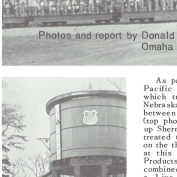
Big Steam in Omaha



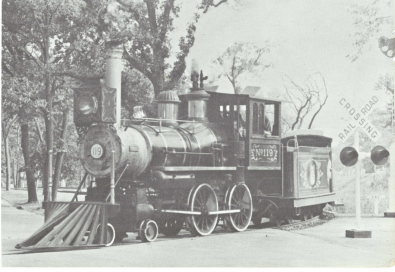
Photos and report by Donald W. Patrick, President
Omaha Area Live Steamers



As part of its Centennial Celebration, the Union Pacific Railroad has built a 30" gauge railroad which travels 2½ miles at the Omaha City Zoo in Nebraska. The depot is located at the end of a valley between two hills from where the train immediately (top photo) rounds a curve and climbs the 4% grade up Sherman Hill (naturally!) and the passengers are treated to a good steam show. An experienced hand on the throttle and some sand on the rail are required at this point, but the 4-4-0 built by Crown Metal Products has plenty of power and the stack-talk combined with a chime whistle provide all the music a Live Steamer could wish for. The train slowly descends along the side of the hill, rounds a curve at the far end of the valley and begins another climb along the side of the opposite hill.

Water tower (left) and signals are all to Union Pacific standards and clear plastic covers permit observation of the relays as they operate.

Relief engineer during the past summer was Robert Recic, Secretary of the Omaha Area Live Steamers, who occupies the fireman's seat as the #119 (lower photo) rounds the curve and eases into the station. The engine is fired with oil, carries 200# boiler pressure, has regulation air brake system, slide valves and Stephenson valve gear. Polished brass boiler backhead and domes keep alive the recollections of a day when locomotives were more than just a machine for moving railroad cars!

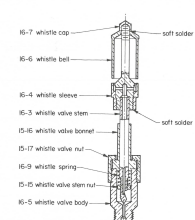


building the RARITAN

by William H. Morewood

On the Whistle Valve Stem (16–3), the ¼–28 thread should be a good fit with the sleeve (16–4). The sleeve should be screwed on until its top is level with the top of the .306 diameter. See that it is centered so that the slot between the two parts is the same width all the way around and then soft solder the threads together.

Adjust the bell (16–6) up and down on its thread until the whistle blows properly. The bell should be concentric with the circular slot. Soft solder the 4–40 thread and the cap, (16–7) on top.



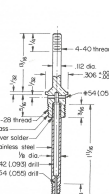
22-1 WHISTLE ASSEMBLY

I.d. wire dia.	1/8 .028 approx.
free length	¼
turns	5

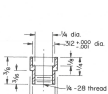
16-9 WHISTLE SPRING
Phos. Bronze - 1 req'd.

16-5 WHISTLE VALVE BODY
Brass - 1 required

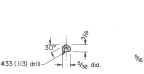
16-6 WHISTLE BELL
Brass - 1 required



16-3 WHISTLE VALVE STEM
1 required



16-4 WHISTLE SLEEVE
Brass - 1 required



16-7 WHISTLE CAP
Brass - 1 required

16-8 HANDRAIL NUT
Brass - 4 required

15-15 NUT
Brass - 1 required

15-16 VALVE BONNET
Brass - 1 required

15-17 VALVE NUT
Brass - 1 required

WHW/wcf © WHW 1962, 1965

DRILLS AND DRILLING *for the apprentice*

by Jack D. McKenty, M.D.

Part 1

Forty per cent of all industrial accidents occur while drilling, usually because the work is not being held properly.

Drilling Machines

The hand drill consists of a small chuck mounted axially on a handle, with a geared wheel and crank on one side to turn the chuck. It can usually take up to ¼" diameter drill bits. It is useful chiefly for work on wood or sheet metal. Since it is hand held, it is difficult to keep it square with the work.

The breast drill is a larger version of a hand drill. It has a cross-wise rest on the end of it so that you can lean your chest or your stomach against it and apply useful pressure when drilling larger holes. There are usually two ways to mount the geared wheel to provide two different gear ratios. The slower speed is for larger drill bits. Breast drills are not as common as they used to be, since they have been largely supplanted by the electric drill.

The ¼" electric drill is the do-it-yourselfer's favorite weapon: it is an electric motor geared down to ¼" chuck. As well as drilling, it can be used with accessories for everything from mixing paint to rocking the baby. It is not perfect: the speed is too slow for tiny drills and far too fast for large ones, and it is even more difficult than the hand drill to keep square with work. But it still has so many uses that it is almost a must in the well-equipped shop, if for no other reason than the household jobs that are always interrupting more serious work.

I have never built a 1½" scale engine, but I suspect that an electric drill would be in constant use while constructing one, since the engine rapidly gets too heavy to move around.

The 3/8" and ½" electric drills are larger versions of the same thing. The added capacity is useful, but the added weight is a detriment.

Safety Precautions

The electric drill is equipped with a three-wire cord and a plug – two power wires and a ground. Never use the drill without grounding it, either by using a proper 3-hole socket (all newer houses have them) or by a separate ground wire to a water pipe. Several people are electrocuted each year through neglecting this precaution. If the drill had been grounded they could have done no worse than to blow a fuse.

Most electric drills have a latch so the trigger switch can be held permanently on. Do not use the latch if you can possibly avoid doing so. If an accident starts it will get worse at the rate of 3,000 revolutions per minute if you can't turn the drill off.

Electric Drill Stands

Stands are available to turn a ¼" or ½" electric drill into a drill press. This is a cheap and dirty method that is best avoided. It is only a makeshift, and can be more trouble than help.

The Drill Press

A drill press is an actual machine tool that is one of the most useful items in the shop. Depending on its height it may be a bench drill or floor drill. Floor drills are more expensive, but don't take up any room on the bench. They can also take larger work pieces.

The standard economy model (Delta or Craftsman) comes with a zero to ½" chuck for drill bits with parallel shanks, and a hand lever feed. The motor, usually a ½ horsepower, is a separate purchase. Four speeds are usually available by changing a drive belt. The more expensive production machines usually take drills with Morse taper shanks, and have automatic feed.

These refinements are unnecessary for the home workshop. Drill bits with Morse taper shanks are quite a bit more expensive than those with straight shanks. And since at home you may change the drill bit almost every hole and, therefore, often change the feed rate that is necessary, an automatic feed may be a nuisance. The English call a drill press with a lever feed a "sensitive drill" since you can feel how the tool is progressing. This is an advantage.

Safety Precautions

The work should always be held from turning. This usually means holding it in a drill press vice. With larger work pieces, the vice should be clamped or bolted to the drill press table, or the work itself can be clamped or bolted to the table. A feature article will describe a "finger-plate" work holder, which can be a useful item.

Instead of a switch on the wall, or a switch on the drill press, the ideal motor control is a foot switch on the floor. Sooner or later you will have a large drill grab a work piece and start trying to swing the vice and everything around. With one hand clutching the vice, and one hand clamped on the feed lever, you will feel like the little Dutch boy facing a dike with three holes in it. Taking your foot off a floor switch makes all serene, and you can get some clamps rather than Bandaids.

A cheap alternative is to tie a string on the wall plug, run it over a hook and down to a board on the floor, tying the bottom end of the string so that one end of the board is a few inches off the floor. When trouble occurs, and it will, tromping on the board pulls the plug out of the wall.

Another "never" is never leave the chuck key in the chuck, even for a moment. It is easy to leave it in while you turn away to get a different size drill bit. If you make a habit of this, sooner or later you will turn on the power with the chuck key still in place. And away it goes, right through the window or a visitor's eye. The same goes for keys in lathe chucks.

Drilling in the Lathe

Drilling axial holes in work being turned is so routine

that a drill chuck is almost a permanent resident in the tailstock. However, using the lathe as a drill press is a makeshift affair at best. The drill bit is held in the 3-jaw chuck, or in a headstock drill chuck, and the work is held against a "drill pad" in the tailstock. Feed is via the tailstock screw. It is inaccurate, slow, and unsafe. The drill press is better.

Drill Bits

The drill bit is the actual tool that is rotated to make the hole. The standard home workshop type is the "high-speed steel, straight shank, jobbers length twist drill"; they are available singly and in sets. Do not bother with carbon steel drill bits. They are useful only on wood; on metal they go dull almost immediately.

Looking at a manufacturer's catalog, or the catalog of a large hardware distributor can be very educational. Drill bits are available in carbon steel, high-speed steel, stellite and carbide. They come with straight flutes for sheet metal, or rapid spirals for plastics. Lengths include stub or screw machine, jobbers, extra length, aircraft or crankshaft, and gun drills, in increasing order of length.

Core drills have the flutes but no point, and flat drills have a point but no flutes. They come straight shank, taper shank and reduced shank. There are drills with oil holes through them, and left-handed drills (on special order).

Sizes include fractional, number, letter and millimeter, and range from .003" to where it takes a strong man to lift one.

But, as I said, we use the high-speed, straight shank, jobbers length.

Generally speaking, we need three sets of drill bits: a set of fractional drills from 1/16" to 1/2" by 64th's; the number drills from 1 to 60; and the letter drills from A to Z.

They come a little cheaper if purchased as sets. The sets should be stored in boxes called "drill boxes" or in "drill stands". This keeps them in order and makes selection easy. Keeping drill bits loose in a drawer is a shortcut to insanity. If you must economize, defer the purchase of the letter sizes; they are used less frequently.

The accompanying table shows the letter, number and fractional drill bits in order of increasing size, and gives their decimal inch sizes. The table may be removed and tacked to the wall of your workshop. You will find you refer to it very frequently.

Note that the table also has number drill bits from 61 to 80. This set will be a still later purchase when you are ready to make one of L.B.S.C.'s injectors. The fractional drills below 1/16" are pretty hard to find, and are not really necessary. Believe it or not, there are still gaps in the table, which could be filled if need be by the metric sizes.

Nomenclature

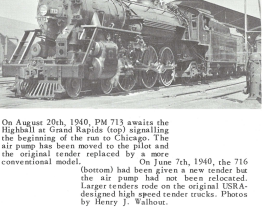
Two notes on words. I have been very careful in this article to distinguish between drills (the machines) and drills (the drill bits). Common usage has the word "drill" used by itself, and context determines meaning.

And don't say "bore a hole" when you mean "drill a hole". Boring is a separate process using a single-point tool, either in the lathe or a special machine for the purpose.

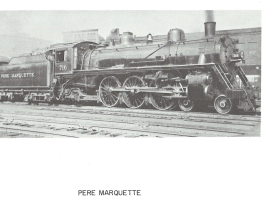
Drills

Fractional	Number Letter	Decimal Inch	Fractional	Number Letter	Decimal Inch
	80	.0135		21	.1590
	79	.0145		20	.1610
1/64		.0156		19	.1660
	78	.0160		18	.1695
	77	.0180	11/64		.1719
	76	.0200		17	.1730
	75	.0210		16	.1770
	74	.0225		15	.1800
	73	.0240		14	.1820
	72	.0250		13	.1850
	71	.0260	3/16		.1875
	70	.0280		12	.1890
	69	.0292		11	.1910
	68	.0310		10	.1935
1/32		.0312		9	.1960
	67	.0320		8	.1990
	66	.0330		7	.2010
	65	.0350	13/64		.2031
	64	.0360		6	.2040
	63	.0370		5	.2055
	62	.0380		4	.2090
	61	.0390		3	.2130
	60	.0670	7/32		.2188
	59	.0410		2	.2210
	58	.0420		1	.2280
	57	.0430		A	.2340
	56	.0465	15/64		.2344
3/64		.0469		B	.2380
	55	.0520		C	.2420
	54	.0550		D	.2460
	53	.0595	1/4	E	.2500
1/16		.0625		F	.2570
	52	.0635		G	.2610
	51	.0670	17/64		.2656
	50	.0700		H	.2660
	49	.0730		I	.2720
	48	.0760		J	.2770
5/64		.0781		K	.2810
	47	.0785	9/32		.2812
	46	.0810		L	.2900
	45	.0820		M	.2950
	44	.0860	19/64		.2969
	43	.0890		N	.3020
	42	.0935	5/16		.3125
3/32		.0938		O	.3160
	41	.0960		P	.3230
	40	.0980	21/64		.3281
	39	.0995		Q	.3320
	38	.1015		R	.3390
	37	.1040	11/32		.3438
	36	.1065		S	.3480
7/64		.1094		T	.3580
	35	.1100	23/64		.3594
	34	.1110		U	.3680
	33	.1130	3/8		.3750
	32	.1160		V	.3770
	31	.1200		W	.3860
1/8		.1250	25/64		.3906
	30	.1285		X	.3970
	29	.1360		Y	.4040
	28	.1405	13/32		.4062
9/64		.1406		Z	.4130
	27	.1440	27/64		.4219
	26	.1470	7/16		.4375
	25	.1495	29/64		.4531
	24	.1520	15/32		.4688
	23	.1540	31/64		.4844
5/32		.1562	1/2		.5000
	22	.1570			

The Pere Marquette's Pacifics



On August 20th, 1940, PM 713 awaits the Highball at Grand Rapids (top) signalling the beginning of the run to Chicago. The air pump has been moved to the pilot and the original tender replaced by a more conventional model. On June 7th, 1940, the 716 (bottom) had been given a new tender but the air pump had not been relocated. Larger tenders rode on the original USRA-designed high speed tender trucks. Photos by Henry J. Walbout.

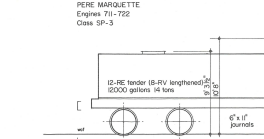


PROTOTYPE SPECIFICATIONS

Cylinders	23" x 28"
Valves	12" Piston Valves, 7" travel, 1.1/16" Lap, ¼" Lead, 3/16" exhaust clearance
Valve Gear	Baker
Boiler	Pressure – 190# p.s.i. Tubes – 176 2" o.d. Flues – 28 5-3/8" o.d. Length – 20' 0" Arch Tubes 4 3" o.d. Superheater tubes 1⅝" o.d.
Firebox	Length – 96⅛" Width – 75⅛" Grate Area 50.4 sq. ft.
Heating Surfaces	Tubes and Flues 2617 sq. ft. Firebox 160 sq. ft. Arch Tubes 23 sq. ft. Total 2800 sq. ft. Superheater 648 sq. ft. Total 3448 sq. ft.
Weights in Working Order	Engine Truck 45,500# Drivers 149,000# Trailing Truck 48,500# Engine Total 243,000# Tender 211,700# Engine & Tender 454,700#
Tractive Effort	31,850#
Journals	Driving, Main 10" x 14" Driving, Others 10" x 12" Engine Truck 6" x 12" Trailing Truck 8" x 14"
Crank Pins	Main 7" x 7½" & 7½" x 8½"
Factor of Adhesion – 4.80	
Cylinder Horse Power – 1809	
Percent Boiler to Cylinder H.P. – 89.11	
Tender Frame – Cast Steel	
Tender Truck Frame – Cast Steel, Equalized Type	
Tender Truck Bolster – Cast Steel	
Superheater – Type A	
Stoker – H. T. on Engine 722	
Reverse Gear – Alco	
Safety Valves – Three 3"	

LIVE STEAM CONVERSIONS

Prototype	¾" = 1'0"	1" = 1'0"	1½" = 1'0"
23"	1.438"	1.916"	2.875"
28"	1.750"	2.332"	3.500"
33"	2.063"	2.749"	4.125"
36"	2.250"	3.000"	4.500"
44"	2.750"	3.665"	5.500"
51"	3.188"	4.248"	6.375"
59-7/8"	3.742"	4.988"	7.484"
60"	3.750"	5.000"	7.500"
62¼"	3.891"	5.185"	7.781"
67"	4.188"	5.581"	8.375"
70"	4.375"	5.831"	8.750"
75"	4.688"	6.248"	9.375"
77"	4.813"	6.414"	9.625"
80"	5.000"	6.664"	9.625"
9'- 3⅛"	6.956"	9.271"	13.911"
9'- 5"	7.063"	9.413"	14.125"
9'- 6"	7.125"	9.496"	14.250"
10'- 0"	7.500"	10.000"	15.000"
10'- 2"	7.625"	10.163"	15.250"
10'- 3"	7.688"	10.246"	15.375"
10'- 8"	8.000"	10.662"	16.000"
10'- 9"	8.063"	10.746"	16.125"
12'-10"	9.625"	12.828"	19.250"
14'- 6"	10.875"	14.494"	21.750"
14'- 8"	11.000"	14.661"	22.000"
14'-11-3/8"	11.248"	14.990"	22.496"
16'- 5"	12.313"	16.417"	24.625"
28'-11"	21.688"	28.905"	43.375"
34'- 6"	25.875"	34.486"	51.750"
74'- 2"	55.625"	74.137"	111.250"
84'- 4-1/8"	63.271"	84.328"	126.542"
45,500#	16.289#	37.902#	122.395#
48,500#	17.363#	40.401#	130.465#
149,000#	53.342#	124.117#	400.810#
211,700#	75.789#	176.346#	569.473#
243,000#	86.994#	202.419#	653.670#
454,700#	162.783#	378.765#	1223.143#



Prepared from data supplied by Philip F. Geary, Jr.
Richard D. Orlik
Philip A. Shuster
Alvin F. Staufer
Henry J. Walhout

As World War I drew to an end, the Pere Marquette again began to update its locomotive roster. Ten 0–8–0 switchers (#1300–1309) from Alco-Pittsburgh were added in February 1918 and fifteen 2–10–2's (#1101–1115) built by Alco-Brooks were delivered the same year. Thirty USRA Mikados (#1011–1040) built by Lima-Schenectady in February 1919 permitted the PM to keep pace with competitive freight schedules and the time had come to consider passenger power.

The Pere Marquette's Pacifics had seen heavy service during World War I but had held up well. Postwar business was good and the older 4–4–2's and 4–6–0's could stand to be used in lighter service – replaced by the newer, faster 4–6–2's in feeder service. There had been nearly ten years of experience with the original ten Pacifics (LS 10/69, LS 11/69) and six years with the five from Baldwin (LS 12/69) to look back on and those records could best be summarized in the PM's newest design. In 1920 (when many railroads were ordering USRA-designed Pacifics or modifications of that popular design) the Pere Marquette went back to the American Locomotive Company and ordered twelve new 4–6–2's similar to those built by Alco's Schenectady Works nine and ten years previous.

Similar perhaps, but by no means identical. The same large 77" drivers were specified but Baker Valve gear was preferred to the Walschaerts used on earlier models. A couple of inches were added to the boiler diameter; not enough to spoil the esthetics, but enough to handle the capacity of the increased firebox. They were lighter and less powerful than the Baldwin-built SP-2 Class, but they were obviously *Pere Marquette Pacifics!*

Polished metal on the rods, valve gear and crossheads gave these engines an air of perfection. Bright cylinder- and valve-head covers with a brass star over a black circle and a projecting bright steel finial were applied, typical of all PM passenger engines. Polished trim stripes covered the front surface of the step rails from the pilot beam to the running boards.

Quick to adapt logical improvements, the PM's new Pacifics were among the earliest of engines to be equipped with the cast "Delta" trailing truck in preference to the Cole type fabricated truck used on earlier Pacifics, and Alco's Power Reverse was installed.

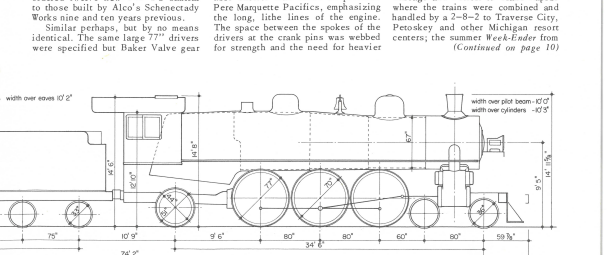
Although the stack was still as tall as those on engines built 10 years earlier, the visual effect of height was later lessened by a large conical base. The cab was considerable shorter than those on previous Pere Marquette Pacifics, emphasizing the long, lithe lines of the engine. The space between the spokes of the drivers at the crank pins was webbed for strength and the need for heavier spokes was avoided. Even the pilot beam, fabricated from formed and welded steel plate without polling pockets, indicated that these engines were not intended for any menial tasks!

But if any one feature was to be singled out from others in the design, it would have to be the tender. Low and long, (with those attributes emphasized by the horizontal lines of the USRA-designed high speed tender trucks) it contributed generously to the racy lines of the new Pacifics. Even the formal, distinctive type style used for the road name and number added dignity to the locomotive.

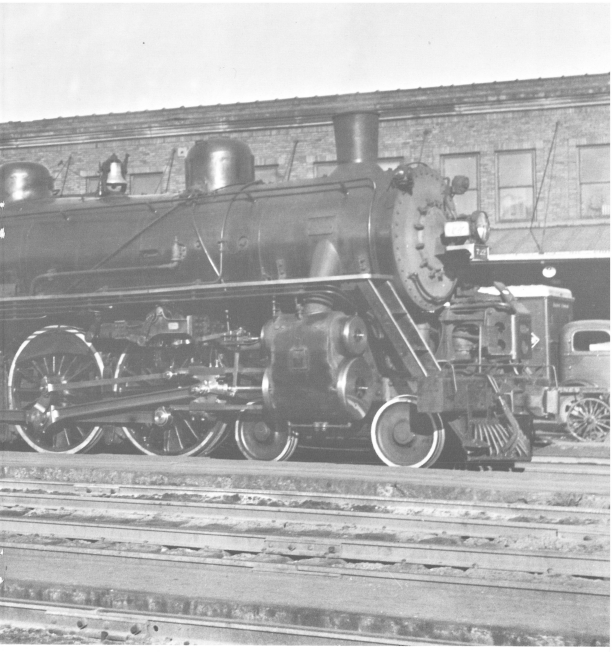
The twelve new 4–6–2's rolled out of the Alco shops in December of 1922, carrying road numbers 711 through 722 and Alco-Brooks builder's plates (PM diagrams show "A.L.Co.-Dunkirk") with numbers 62582 through 62595, and it is no surprise that the SP-3 Class was immediately proclaimed to be the *QUEEN OF THE FLEET!*

The "Queens" reigned long and proudly, handling all the Pere Marquette's crack passenger trains: the Detroit-Toledo section of *The Sportsman;* the summer *Resort Special* from Chicago and Detroit to Grand Rapids where the trains were combined and handled by a 2–8–2 to Traverse City, Petoskey and other Michigan resort centers; the summer *Week-End* from

(Continued on page 10)



Queen of the Fleet



In a classic pose, the 722 was captured on film by Henry J. Walhout as it stood ready for departure of train #3 at 12:05 p.m. on September 21st, 1940 in Grand Rapids, Michigan; destination Chicago.

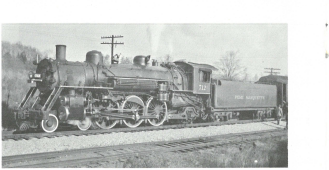
Chicago to Muskegon; the *Chicago Limited* between Grand Rapids and Chicago as well as trains 5–4 and 6–7 between Grand Rapids and Detroit. They pulled passenger specials for many groups and officials over the entire system – even on the ordinarily freight-only section of the PM's tracks in Ontario.

When consistently heavier trains became the rule in the late 1930's and the early 1940's, several of the engines were given larger tenders but a few of the original tenders were lengthened to increase the water capacity from 8,000 to 12,000 gallons. Coal supply remained at 14 tons. About that same time, the air pumps were moved to a shielded position on the bumper plate in accordance with the Pere Marquette's established practice.

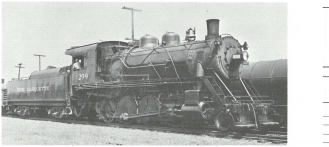
But no Queen reigns forever. By August of 1947 the PM's passenger trains were all handled by diesels and there was no further need for these sleek steamers. The merger with the C&O was, by that time, complete but the high-drivered, small-boilered "Queens" were of little use to the Chesapeake District. Although the C&O assigned them Class F-14 and new numbers 410 through 421, records indicate that only two of these engines ever received the new road's name and numbers – the 717 (C&O 416) and the 722 (C&O 421).

In December of 1949, all twelve of the engines were retired from the C&O roster and within a few months all had been sold to the Luria Brothers, scrap dealers in Chicago. The 721 was first on April 3rd, 1950, and the 715 and 716 followed on April 10th. On April 30th, the 711, 712 and 713 were added to the list – the 711 bringing a reported $3461! The remaining six engines of the SP-3 Class went to Luria Brothers on May 22nd, 1950 . . . ending for a time the story of the Pere Marquette's Pacifics.

All stories, though, should have a happy ending and this is no exception. The very reason that this series of articles was possible, came about as the result of a search for information for a Live Steamer interested in building an inch-and-a-half scale version of one of the "Queens". Who knows, before too long the polished steel rods and valve gear may again flash in the sunlight as a miniature version of the Pere Marquette's Pacifics carries its engineer astraddle its long, low tender with a trainload of admirers of the *QUEEN OF THE FLEET!*



The 715 on an Official Inspection Train (cop) makes a trip over the PM's freight-only rails in Ontario on October 31st, 1957. O. P. Maus caught this shot at St. Thomas Jct. as the train headed west with a steel coach, wood official car #3, steel official cars PM #2, C&O #29 and N&P #1. The 712 (center) at Grand Ledge, Michigan, November 7th, 1937, had its original tender lengthened. It was the only one of the altered tenders which had the rolled sides at the coal bunker extended to the rear of the body. W. R. Dewey, Jr., snapped this picture on a Fan Trip. When the 711 was given a new 10,000 gallon – 16 ton tender in 1938, its original equipment was mounted on Dalman trucks and attached to 2–8–0 #299 (Brooks 1905 – #306321). When T. A. Rader made this picture at North Bay City, Michigan in April 1938, its racy lines were missing, its proportions de-emphasized by the smaller engine to which it was assigned. Photos from Henry J. Walhout Collection.



TENDERS

FABRICATING THE TENDER

Tenders for Live Steam may be fabricated from most of the common sheet metals: steel, galvanized steel, stainless steel or brass. Aluminum is definitely not recommended due to its high rate of corrosion when in contact with water.

Raw steel tenders have the disadvantage of creating rust which eventually breaks loose and gets under the pump valves. This problem can be eliminated after the tender is checked out for leaks after soldering over all joints and the inside rivet heads and, also, neutralizing the soldering flux by painting the inside of the water section with Rustoleum primer, and then a coat of Rustoleum.

Galvanized steel is excellent for tender fabrication since the galvanized coating will protect the base metal (steel) for the life of the locomotive. However, copper rivets should be used so that they can have their inside heads soldered over to protect against leaking. Don't consider that a rivet will be water-tight just because it appears to be well-driven. With about 600 to 1,000 rivets in a tender (1" scale) the builder will be lucky if no more than 10% of them leak. This also applies to joints. Play safe – solder everything on the inside where it doesn't show.

Stainless steel is an excellent metal for tenders since it doesn't rust and resists deformation when being riveted. It must be noted at this point that when drilling for rivets in the softer metals, the mortality of small drills will be very high. For a stainless steel tender, the mortality of rivet drills can go as high as three to four times. This includes resharpening dull drills and sharpening drills after breakage. By the time the tender is riveted, the tender builder will get to be pretty good on sharpening 1/16" and 3/32" drills. Stainless steel has a tendency to glaze if the drill isn't continuously pushed. This will dull a drill in a hurry. The next step – a broken drill!

Sheet brass is ideal for tenders since it doesn't rust and is easily soldered. Care must be taken during torch soldering since too much heat in one spot will buckle the sheet which then will not come back to its original flatness.

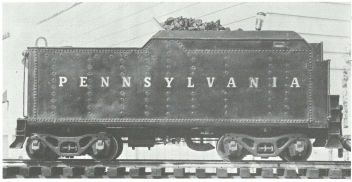
FABRICATION DETAILS

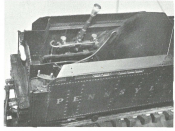
Particular note should be made of the rivet pattern since, for some roads, the rivet pattern gives the tender its personality. The Pennsylvania Railroad tenders with 4-wheel trucks, for example, showed a family characteristic to the rivet pattern until the stoker Kiesel tender was brought out. However, when the Kiesel hand-fired tenders (used on K-4s) were converted to stoker, the rivet pattern was no longer functional but it was still maintained although the length of the coal bunker and the firing deck height conformed to the stoker tenders. Where a tender has a definite rivet pattern, the builder should disregard rivet scale and go to the next size larger rivet. This will make the pattern stand out and the observer will never know that his eye is being fooled.

SOLDERING

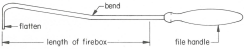
When soldering the joints on a galvanized tender, make certain that the exposed ends of the galvanized sheets are covered with solder so that corrosion cannot start with the bare steel. This writer has consistently pointed out the necessity of using 95–5 solder around the Live Steam locomotive. Soldering tender seams and covering rivet heads, however, is an exception since the rivets are carrying all the load and the solder merely acts as a seal against leakage and corrosion. Therefore, under these conditions, 50–50 solder will actually be better than 95–5 since it will tin a surface easier than 95–5 and will work with less heat. For heat, the Prest-O-Lite torch is recommended with the medium and smallest tips preferred. In some places, it is advantageous to use a large electric soldering iron after heat in the assembly has been brought up with the torch. Where possible, incline the surface of the work and, after preliminary heating, start the soldering at the top of the seam, or row of rivets and run the solder down over the surface as the heat advances.

Where muriatic acid is used for soldering flux, use uncut acid to solder galvanized metal, and use cut acid (enough zinc dissolved in muriatic until no more zinc will dissolve) to solder other metals. Where cast iron is to be soldered, clean the iron with a file or emery cloth

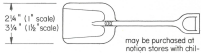




PRR 110 P 75 tender with 2F-T2 trucks for the authors K-4 in 1" scale. Visible are marker lights, dummy water scoop and auxiliary reservoir. Brake rigging along with the water drain cock are visible beneath the tender bottom. The tender body may be removed from the chassis by removing four bolts. The view above shows the coal box and bunker side removed to expose hand pump installation, removable pump handle as well as pump suction and discharge lines and the engine pump by-pass line.



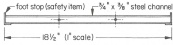
SPLICE BAR-HOE



STEEL SHOVEL

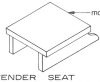
IMPERIAL DRAIN COCK

TENDER BEADING



STIRRUP (FOOT REST)

WATER OUTLET THREADING BOSS



TENDER SEAT

"Centipede" tender in ¾" scale by Donald Strom for his Union Pacific "Challenger". These tenders were used on many articulated, Northern and Hudson type locomotives in the latter days of steam.

and then apply a solution of copper sulphate dissolved in water. If this is properly done, the solution will leave a very thin layer of copper on the cast iron. This is easy to solder to. After soldering is completed, neutralize with baking soda dissolved in water. Before attempting to put tender in service, fill with water and make a leak test. Testing with water also applies to the fuel oil tank, since if a leak requires resoldering with a torch, an explosion could result if fuel has been in the oil tank. After testing is successful, dry out the fuel tank before using it.

All steel tenders can be galvanized on the inside and will be perfectly rust-free. Where water connections go, rivet the threading bosses in their proper locations and after galvanizing, drill and tap the bosses for their respective taper threads. Gald seaming, if properly done, will seal seams and rivets from the inside and inside soldering will be unnecessary. If the tender has a rivet pattern, the outside of the tender should not be galvanized since it would destroy the definition of the rivets. Before ordering the galvanizing done, a talk with the shop superintendent would be in order so that he understands what is wanted and he can decide what preparation is necessary to make a water tight and corrosion-proof job.

NOTE: Aluminum is impractical for tenders since joints are hard to seal and it is easily corroded when it is in contact with moisture.

PAINTING

Since paint or enamel doesn't adhere very well to galvanized, brass, or copper surfaces, it would be advisable to prepare the surface before painting to insure a good job. For galvanized surfaces, wash thoroughly and then swab the surface with a diluted solution of raw muriatic acid. For copper and brass, use a diluted solution of nitric acid. These acids may be diluted to 3 water and 1 acid or even weaker. More water slows down the action and also, the heat generated in the process. When a velvet surface appears, wash off the acid.

WARNING – ACID IS DANGEROUS!

1. Use rubber gloves when handling acid.
2. Use goggles to protect the eyes in case of accident.
3. When diluting acid, pour acid into the water, never pour water into the acid, since this will cause a violent reaction.
4. If acid spills on a cement floor or walk, flush it off immediately since acid dissolves cement and concrete.
5. Be careful not to breathe acid fumes. Work in a well-ventilated place.

For those who are in a position to obtain it, a solution called "Metal Prep" will prepare surfaces so that paint or enamel will permanently adhere.

IMPORTANT! Many tender builders rivet, solder, or weld the top of their tender permanently in place and then make the sad discovery that the top has to be removed to clean out rust, mud, or mill scale. Make the top of the tender so that it can be removed easily to perform an inspection for insects that may lodge there during long periods of inactivity and also to remove and clean a suction screen on the injector suction line. It must be borne in mind that while the top must be easily removable, it must be tight enough to keep out dirt, coal dust, and other forms of trash that will eventually get under the pump valves.

All-new Track for

Waushakum Live Steamers

by George Hildreth

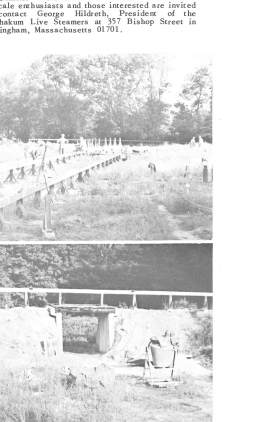
PHOTOS BY ARTHUR BUTLER

There's been lots of activity in Holliston, Massachusetts, where the Waushakum Live Steamers have been busy during the past several months building a brand-new track. From the pictures here it looks like it is sure going to be a winner!

The new track is a thousand feet long and at present the 3½" gauge track is in place with provision for 4¼" gauge in the future.

The last run on the old facility was made on November 1st and a trial run on the new track was made on November 16th. Regular run days will be resumed on Sunday, April 12th, 1970, at the new track which is located at 370 Norfolk Street in Holliston, Massachusetts.

Numerical reinforcement is needed for the lone member of the club who works in 1" scale! Plans now call for the third rail laying for the 4¼" track to begin next summer. There is room in the club for additional 1" scale enthusiasts and those interested are invited to contact George Hildreth, President of the Waushakum Live Steamers at 357 Bishop Street in Framingham, Massachusetts 01701.



mail stop

PUMP INSPECTIONS NECESSARY

In almost every issue I read of the passing of some Live Steamer friend about 60 years of age from heart trouble. I sincerely wish to say from lots of experience with my own heart that I am saddened by every single case I hear of.

No one knows better than the veteran Live Steam man how important it is to get the engine into the shop and look after necessary maintenance, yet I am amazed to hear of men who know their personal "mechanisms" are in need of "shop attention" and fail to have regular check-ups and necessary work done.

Three years ago, when I had my heart checked, one of the valves was found to have a 90% blow back. I could barely walk 50 yards and I am told my complexion was definitely gray. In the hospital they passed a tube right into my heart and I saw the faulty results myself on a TV screen. This is like a 90% blow back in a feed water check. The bad valve was replaced in an open-heart operation with a 7/8" diameter plastic ball working on a Teflon disc with a stainless seat. It works fine even though the ball makes a lot of noise as it jumps up and down in a stainless steel cage. The point is that my pump got the attention that was necessary and I am still around.

Another item of our "personal mechanism" is the necessity of the heart to circulate blood into the lungs to pick up oxygen. This heart-lung business is all inter-connected. In our engines we know very well that the fire bars need to be kept clean of clinkers to get oxygen to the fire – and the fire tubes need to be clean to get heat into the water – and choked superheater flues are useless. Yet, so many fail to see their doctors until the whole bag of tricks is in a deplorable condition, and then there is a small paragraph in LIVE STEAM Magazine. Shortness of steam comes from all kinds of things. So does shortness of breath. So much can be done today, however. It's too bad that we don't have bolt-on valve chest covers and easily accessible works. To replace a heart valve requires major surgery and it isn't much fun.

I sincerely thank all those who help me get my locos out on the track so I can take a turn at the throttle occasionally. I never knew what good friends I had until I needed them. I want to say to my friends all over the world that I have found Live Steamers to be the most wonderful example of a true Brotherhood in every respect.

I just got home today (September 19th) from another few weeks in the hospital and I feel pretty happy about it!

FRED MASSEY
GONDOLA POINT ROAD
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ROTHERAY, NEW BRUNSWICK
CANADA

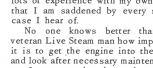
ADD ONE MORE TO OUR RANKS!

I have certainly enjoyed getting LIVE STEAM Magazine and it has sure made me want to give up the HO scale and get into the big stuff.

Mr. Maynard's article on the 3¼", I think, did the trick. Having never seen anything smaller than about 15" gauge or so, I still can't imagine riding behind a ¾" Tom Thumb – but it sure sounds like it would be fun.

J. M. HURT
7250 DRAPER ROAD
JACKSON, MICHIGAN 49201

Scheduled Meets



April

10 MID-SOUTH LIVE STEAMERS
11 7½" gauge
12 Austin F. Barr, Jr. track
Junction of Highways 1 and 214 at Marshall
Route 2
Harrisburg, Arkansas 72432

May

29 BLS NATIONAL MEET
30 Los Angeles Live Steamers
31 Griffith Park
3½" – 4¾" – 7½" gauges
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June

6 IOWA MODEL STEAM
7 ENGINEERS
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September

12 IOWA MODEL STEAM
13 ENGINEERS
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